
APPENDIX A PHOTOGRAPHS



Photo 1—Wetland B3 showing emergent wetland in depression.



Photo 2—Disturbed upland area near Wetland C1.



Photo 3—Wetland E1 looking south along transect at emergent wetland in background.



Photo 4—Wetland E1 along north edge contains a cottonwood-lined depression.



Photo 5—Wetland M5 consists of cottonwood-lined depression.



Photo 6—Wetland M5 consists of cottonwood-lined depression.



Photo 7—Ditch 4B consists of ditch lined by emergents.

APPENDIX B
PLANT SPECIES OBSERVED ON-SITE

List of plant species observed in Magnuson Park Project Area.

Stratum	Scientific Name	Common Name	Indicator^a
Trees	<i>Acer macrophyllum</i>	Bigleaf maple	FACU
	<i>Alnus rubra</i>	Red alder	FAC
	<i>Arbutus menziesii</i>	Madrone	NI
	<i>Betula pendula</i>	European white birch	FACW
	<i>Populus alba</i>	White poplar	NI
	<i>Populus balsamifera</i>	Black cottonwood	FAC
	<i>Populus nigra 'Italica'</i>	Lombardy poplar	NI
	<i>Populus tremuloides</i>	Quaking aspen	FAC+
	<i>Pseudotsuga menziesii</i>	Douglas fir	FACU
	<i>Sorbus aucuparia</i>	Mountain ash	NI
	<i>Thuja plicata</i>	Western red cedar	FAC
Shrubs	<i>Cornus sericea</i>	Red-osier dogwood	FACW
	<i>Crataegus monogyna</i>	English hawthorn	FACU+
	<i>Cytisus scoparius</i>	Scotch broom	FACU
	<i>Fraxinus latifolia</i>	Oregon ash	FACW
	<i>Ilex aquifolium</i>	Holly	FACU
	<i>Malus fusca</i>	Western crabapple	FACW
	<i>Malus sp.</i>	Domestic apple	NI
	<i>Oemleria cerasiformis</i>	Indian plum	FACU
	<i>Prunus sp.</i>	Domestic cherry	NI
	<i>Rhamnus purshiana</i>	Cascara	FAC-
	<i>Rosa eglanteria</i>	Sweetbrier rose	FACW
	<i>Rosa nutkana</i>	Nootka rose	FAC
	<i>Rubus spectabilis</i>	Salmonberry	FAC+
	<i>Salix alba var. vitellina</i>	Golden willow	NI
	<i>Salix hookeriana</i>	Hooker willow	FACW-
	<i>Salix lucida</i>	Pacific willow	FACW+
	<i>Salix scouleriana</i>	Scouler willow	FAC
	<i>Salix sitchensis</i>	Sitka willow	FACW
	<i>Spiraea douglasii</i>	Hardhack	FACW
	<i>Symphoricarpos albus</i>	Snowberry	FACU
Vines	<i>Hedera helix</i>	English ivy	NI
	<i>Rubus armeniacus</i>	Himalayan blackberry	FACU
	<i>Rubus laciniatus</i>	Evergreen blackberry	FACU+
	<i>Rubus ursinus</i>	Trailing blackberry	FACU
Herbs	<i>Achillea millefolium</i>	Yarrow	FACU
	<i>Aster subspicatus</i>	Douglas aster	FACW
	<i>Bellis perennis</i>	Lawn daisy	NI
	<i>Cardamine sp.</i>	Bittercress	NI
	<i>Cirsium arvense</i>	Canada thistle	FACU+
	<i>Cirsium vulgare</i>	Bull thistle	FACU
	<i>Daucus carota</i>	Queen anne's lace	NI
	<i>Epilobium ciliatum</i>	Willow-herb	FACW-

Stratum	Scientific Name	Common Name	Indicator ^a
	<i>Equisetum arvense</i>	Field horsetail	FAC
	<i>Equisetum telmateia</i>	Giant horsetail	FACW
	<i>Galium trifidum</i>	Small bedstraw	FACW+
	<i>Geranium dissectum</i>	Cut leaf geranium	NI
	<i>Geranium molle</i>	Dovefoot geranium	NI
	<i>Hypochaeris radicata</i>	Cat's ear	FACU
	<i>Lamium purpureum</i>	Purple dead-nettle	NI
	<i>Lotus corniculatus</i>	Birdsfoot trefoil	FAC
	<i>Lupinus polyphyllus</i>	Lupine	FAC+
	<i>Lythrum salicaria</i>	Purple loosestrife	FACW+
	<i>Myosotis sp.</i>	Forget-me-not	NI
	<i>Plantago lanceolata</i>	Lance-leaf plantain	FAC
	<i>Polystichum munitum</i>	Sword fern	FACU
	<i>Pteridium aquilinum</i>	Bracken fern	FACU
	<i>Ranunculus repens</i>	Creeping buttercup	FACW
	<i>Rumex acetosella</i>	Sheep sorrel	FACU+
	<i>Rumex crispus</i>	Curly dock	FAC+
	<i>Solanum dulcamara</i>	Bittersweet nightshade	FAC+
	<i>Stellaria sp.</i>	Starwort	NI
	<i>Taraxacum officinale</i>	Dandelion	FACU
	<i>Trifolium dubium</i>	Hop clover	UPL
	<i>Trifolium pratense</i>	Red clover	FACU
	<i>Typha latifolia</i>	Cattail	OBL
	<i>Verbascum thapsus</i>	Common mullein	NI
	<i>Vicia sativa</i>	Common vetch	NI
Grasses, Sedges, and Rushes	<i>Agrostis capillaris</i>	Colonial bentgrass	FAC
	<i>Agrostis gigantea</i>	Redtop	FAC
	<i>Alopecurus geniculatus</i>	Water foxtail	OBL
	<i>Alopecurus pratensis</i>	Meadow foxtail	FACW
	<i>Anthoxanthum odoratum</i>	Sweet vernal grass	FACU
	<i>Carex obnupta</i>	Slough sedge	OBL
	<i>Dactylis glomerata</i>	Orchardgrass	FACU
	<i>Elytrigia repens</i>	Quackgrass	FAC-
	<i>Festuca arundinacea</i>	Tall fescue	FAC-
	<i>Holcus lanatus</i>	Common velvetgrass	FAC
	<i>Juncus balticus</i>	Baltic rush	FACW+
	<i>Juncus effusus</i>	Soft rush	FACW
	<i>Lolium perenne</i>	Perennial ryegrass	FACU
	<i>Phalaris arundinacea</i>	Reed canarygrass	FACW
	<i>Phleum pratense</i>	Common timothy	FAC-

^a Wetland indicator status based on Reed (1988) where: obligate wetland (OBL), facultative wetland (FACW), facultative (FAC), facultative upland (FACU), upland (UPL), and not indicated (NI).

APPENDIX C
ECOLOGY'S COMPENSATION RATIOS GUIDANCE

Table 8C-11. Mitigation ratios for projects in western Washington.

Category and Type of Wetland Impacts	Re-establishment or Creation	Rehabilitation Only ⁴	Re-establishment or Creation (R/C) and Rehabilitation (RH) ⁴	Re-establishment or Creation (R/C) and Enhancement (E) ⁴	Enhancement Only ⁴
All Category IV	1.5:1	3:1	1:1 R/C and 1:1RH	1:1 R/C and 2:1 E	6:1
All Category III	2:1	4:1	1:1 R/C and 2:1 RH	1:1 R/C and 4:1 E	8:1
Category II Estuarine	Case-by-case	4:1 Rehabilitation of an estuarine wetland	Case-by-case	Case-by-case	Case-by-case
Category II Interdunal	2:1 Compensation has to be interdunal wetland	4:1 Compensation has to be interdunal wetland	1:1 R/C and 2:1 RH Compensation has to be interdunal wetland	Not considered an option ⁵	Not considered an option ⁵
All other Category II	3:1	6:1	1:1 R/C and 4:1 RH	1:1 R/C and 8:1 E	12:1
Category I Forested	6:1	12:1	1:1 R/C and 10:1 RH	1:1 R/C and 20:1 E	24:1
Category I based on score for functions	4:1	8:1	1:1 R/C and 6:1 RH	1:1 R/C and 12:1 E	16:1
Category I Natural Heritage site	Not considered possible ⁶	6:1 Rehabilitation of a Natural Heritage site	R/C Not considered possible ⁶	R/C Not considered possible ⁶	Case-by-case
Category I Coastal Lagoon	Not considered possible ⁶	6:1 Rehabilitation of a coastal lagoon	R/C not considered possible ⁶	R/C not considered possible ⁶	Case-by-case
Category I Bog	Not considered possible ⁶	6:1 Rehabilitation of a bog	R/C Not considered possible ⁶	R/C Not considered possible ⁶	Case-by-case
Category I Estuarine	Case-by-case	6:1 Rehabilitation of an estuarine wetland	Case-by-case	Case-by-case	Case-by-case

NOTE: Preservation is discussed in the following section.

⁴ These ratios are based on the assumption that the rehabilitation or enhancement actions implemented represent the average degree of improvement possible for the site. Proposals to implement more effective rehabilitation or enhancement actions may result in a lower ratio, while less effective actions may result in a higher ratio. The distinction between rehabilitation and enhancement is not clear-cut. Instead, rehabilitation and enhancement actions span a continuum. Proposals that fall within the gray area between rehabilitation and enhancement will result in a ratio that lies between the ratios for rehabilitation and the ratios for enhancement.

⁵ Due to the dynamic nature of interdunal systems, enhancement is not considered an ecologically appropriate action.

⁶ Natural Heritage sites, coastal lagoons, and bogs are considered irreplaceable wetlands because they perform some special functions that cannot be replaced through compensatory mitigation. Impacts to such wetlands would therefore result in a net loss of some functions no matter what kind of compensation is proposed.

APPENDIX D
SAND POINT MAGNUSON PARK
VEGETATION MANAGEMENT PLAN 3-YEAR ESTABLISHMENT CARE

SECTION 6: MANAGEMENT AND MAINTENANCE PRACTICES

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6.0 MANAGEMENT AND MAINTENANCE PRACTICES

The practices described below are those referenced in Section 5 of this document, and are meant to provide the greater level of detail needed to carry out maintenance and project-specific work outlined in this VMP. Sections 5 and 6 are meant to be used together to describe what is to be done, when, and where (Section 5) and specifically how to do it (Section 6). The following practices for maintaining, restoring, establishing or removing vegetation have been developed for this VMP with adaptation in some portions from Seattle DPR Landscape, Horticulture and Urban Forestry Best Management Practices Manual (BMPs) (1999) and ‘City Among the Trees’ (1998). These practices have been crafted to address the conditions and policies present at Sand Point Magnuson Park. Specific emphasis has been provided for control of non-native invasive species; how to care for, establish, and maintain native vegetation in natural area restoration and enhancement projects at the Park; and how to restore the historic developed landscapes at SPMP.

6.1 Amending Soils

The soil at SPMP is for the most part highly disturbed hard sandy silt to silty sand fill soil that is poorly drained because it has been highly compacted. The topsoil layer is no more than 2-3” deep, when present at all. Organic content is very low in these disturbed mineral soils. These soil characteristics favor opportunistic non-native invasive species, as well as early successional native pioneer species. Planting projects in the natural areas should reflect this in the choice of species, but in many cases it may be desirable to amend the soil throughout the area to be planted to improve site conditions for optimal success. Amendment of soil may need to be accompanied by mechanical ripping or scarification of the soil and/or tilling in of amendments to add organic material throughout the top 12” root zone. In developed landscape areas, soil amending can be done in specific planting beds, and where specimen trees are to be installed. Plant species choices in these areas should also reflect the site specific conditions.

If soil amendments are part of a natural area project, amending should be done throughout a planting area, not by adding nutrient-rich soil to each individual plant pit. Doing a soil test to determine specific nutrient deficiencies may be desirable. Generally, the best way to add soil amendments to an area is to clear the site of invasives, aerate or scarify the soil if necessary, and then spread amendment (e.g. Cedargrove compost or equivalent) on the surface throughout the planting area. Amendment should then be tilled into the site with a tractor tiller or equivalent to incorporate it into the top 12” of the soil. Seasonal timing of this should be such that bare soils are not exposed to winter rains. Therefore, if done in the fall after summer weed removal, soil should be seeded or covered with wood chips whether or not site is planted that season. For logistical reasons such as cost, access, or lack of machinery, amending in this way may not be feasible. In this case, limiting the plant palette and planting into existing soil, or choosing a different technique are recommended.

Experimental soil amending can also be done at SPMP to explore other ways of improving soil health and thereby increasing planting success. The use of biosolids, used in gravel pit reclamation and road decommissioning work, for example, may be

applicable at SPMP. Simple application of wood chips and leaf mulch onto the soil surface may also be a way to effectively get organic content back into the soil. For soil amending in developed landscape areas, aerate and/or till the soil as needed, and apply amendments such as compost, GroCo/SteerCo, sand, or perlite to annual beds at planting time.

6.2 Establishing Meadow

(to be inserted)

6.3 Maintaining Meadow

Upland meadows must be actively managed to keep them from being colonized by woody species and converted into a later successional stage plant community. Infrequent but regular mowing is recommended as the best way to achieve this. The timing of mowing should minimize adverse impacts to nesting and feeding wildlife (particularly birds). Spring and summer mowing should be avoided to protect ground-nesting birds, and to allow birds time to forage for seed in summer. Mowing should occur in September, and for established meadow areas can be done at a frequency of once every second or third year. Mowing height should be approximately 5-6", unless management of target weed species requires lower cutting.

For meadows that currently have a high degree of invasion, or for newly establishing meadows that have been converted from non-native shrub thickets, mowing may need to be done annually for adequate suppression of woody species until woody species occurrence is sufficiently reduced. In some cases, additional brush control by hand-weeding may be necessary.

If meadow areas exhibit presence of invasive or noxious herbaceous species that is persistent, problematic, or increasing in coverage, mowing timing may need to be adjusted to occur earlier (July or August) so that the area is mowed before seed production and drop. Timing will depend on flowering and seed production of target species. Mowing height may need to be adjusted as well. Earlier seasonal mowing should only be done if needed, and if this timing adjustment is limited to a small (<0.5 acre) area at any one time. Maximum and minimum thresholds for target species occurrence should be determined as part of project monitoring recommended for any maintenance practice alteration. Alteration of mowing timing should be monitored, evaluated for effectiveness, and shifted back to later season (September) when weed suppression is adequate based on established thresholds.

The use of controlled burning as a means of meadow management may be a desirable option at some time in the future. This would have to be done in concert with the local fire department and applicable City and County regulations, and begin with some limited test burns to evaluate the effectiveness of this method. Current County regulations prohibit controlled burning as a maintenance option at this time. Therefore, no detailed burn plan is being proposed in this VMP.

6.4 Mulching

Mulching is one of the easiest and most important maintenance practices for protecting and nurturing all vegetation types. Mulching is an essential component of any natural area planting project for suppressing weeds/invasives and thereby reducing root competition, to conserve soil moisture and keep soil cool, and to add organics to the nutrient-deficient soils. In developed landscape areas it also serves these functions, as well as adding a cared-for appearance. Mulching material in developed landscape areas may include bark products, wood chips, compost, GroCo, grass clippings, cardboard, leaves or pebbles. In natural areas, the most desirable mulch material is a combination of cardboard sheet mulch overlain by 4-6" of wood chips. Compost, GroCo, or leaf mulch can be added either on top of or underneath the cardboard layer if soil amendments are desired. Where large areas of invasives have been removed, the entire planting area should be sheet mulched and wood chipped to minimize re-invasion. In most cases, wood chips of recycled Parks Department plant material are available at no cost. Plastic, landscape fabric or inorganic mulch should be avoided in most cases, except as specified for highly invaded areas, where it may be the most effective strategy.

Trees

- Clear weeds and grass from under the tree, in a circle out to the drip line at the tips of the branches.
- Where weeds are very aggressive, use a "sheet mulch" of thick layers of newspaper or cardboard.
- Spread layer of organic mulch, 2-4" deep in developed landscape areas, 4-6" deep in natural areas, in a circle out to the tree's drip line or in a 3' diameter circle (whichever is greater).
- Keep mulch away from the tree trunk to prevent crown rot or insect damage.
- Maintain 3"-4" of mulch annually in developed landscape areas, 4-6" in natural areas (during 3 year establishment period or beyond as needed).

Shrubs

- Follow similar procedures as for trees, above.
- Spread layer of organic mulch 2-3" deep in developed landscape areas, 4-6" deep in natural areas and 2-3' in diameter around shrub.
- Cover entire planting bed with mulch where applicable.
- Keep mulch away from contact with crown of plant.

Herbs

- Flowerbeds and smaller plant material should be mulched with finer material.
- Spread layer of mulch 1-2" deep depending on size and spacing of plants.
- Avoid drift of mulch onto turf or pavement by recessing edge of beds.
- Do not smother plant crowns with mulch.

Adapted from DPR's Landscape, Horticulture and Urban Forestry BMPs (1999) and 'City Among the Trees' (1998)

6.5 Planting

Trees

The two basic steps in planting are preparing the site, and setting the tree or shrub. Proper preparation will encourage root growth rather than adding to the difficulties already challenging the newly planted trees or shrubs.

- Ideal planting hole is 2-3x the diameter of the root spread or the root ball (depending on existing soil conditions)
- Minimum planting hole is 12" wider than root spread or root ball
- Hole shall be no deeper than the ball and the ball shall sit firmly on the undisturbed subsoil
- Native soil shall be used to backfill the planting hole except in situations where the existing soil is contaminated or filled with rubble or pure clay
- Trees shall not be fertilized at the time of planting
- Balled-and-burlapped trees shall be placed in the hole and plumbed vertically. All rope shall be removed from around the trunk of the tree and the top 1/3 of the burlap shall be folded back down into the hole. Whenever possible complete removal of the top third of burlap by cutting it away with a sharp knife is preferred. Do not remove any B&B packaging material until the tree is placed in the hole and securely plumbed into its final position.
- Trees in wire baskets shall have all of the basket removed, using bolt cutters
- Backfill soil in lifts of 4-6" at a time with compaction of each layer. Do not compact muddy backfill. Water thoroughly after backfilling to settle the soil, eliminate air pockets and re-wet the root system.
- If project scope allows, watering soil rather than compacting is preferred. Backfill ½ the soil in the tree pit and thoroughly drench with water to settle. Complete backfilling and then thoroughly drench with water again. This method is preferred for removing air pockets and settling soil, but can be impractical on big jobs or jobs using volunteers.
- Trees planted in sandy or loamy soils should have a 3" high berm erected just past the perimeter of the planting hole to funnel water to the root ball and wet the hole/sidewall interface.
- Berms should not be constructed in clay soils or on heavily compacted sites.
- Stake only in situations where normal planting procedures does not provide a stable plant, otherwise, staking is not generally required.
- Staking is sometimes recommended as a vandal deterrent device or to prevent mechanical injury from mowers or trimmers. Ties for stakes should be some biodegradable or flexible fastener that precludes collaring of the trunk if the ties are not removed in a timely fashion.
- Stakes shall be removed at the end of the first year.
- Plant trees at the depth they were growing in the nursery.
- Do not wrap tree trunks.
- Remove tree trunk wrapping materials, tags, and all ties at the time of planting.

Shrubs (refer to general guidelines for trees, above)

- If needed, incorporate fertilizer into soil before adding plants.
- Wait until plants are established before adding chemical fertilizer.
- Plant at proper depth taking into consideration room for mulch.
- Plant shrubs with proper spacing to allow for spread at mature size.
- Plant bareroot stock at the same grade as grown in the nursery.

Herbs

- Plant ground cover and floral plantings to provide adequate coverage to compete with weeds.
- In landscaped beds, plant to provide effective display.
- Do not crowd.
- Remove containers prior to placement in the planting pit.
- Tease pot-bound roots with hands or tools prior to final placement in planting pit.
- Protected bare root plants from root drying prior to and immediately after planting.
- Cleanly prune exceptionally long roots to create a uniform root mass.

Live Stakes

Live stakes are cuttings harvested from live native plants. Stakes are cut from the parent plant, and then installed directly into the soil where they establish roots and grow to maturity. The best species to use for live stakes are willow species, black cottonwood, and red osier dogwood. Stakes should be planted in areas that will be consistently moist through out the growing season, such as along the waterline at the lakeshore and in wetland areas. Although live staking can be done throughout the year, to maximize survival the best time for taking cuttings and installing them is during the dormant season, between early November and late February.

Stakes can be harvested from an appropriate site or purchased. They should be installed as soon as possible after harvesting – ideally within 24-72 hours – and kept wet in a bucket and in the shade until installation. Stakes should be at least 2-3' in length and $>\frac{3}{4}$ " diameter for willows and cottonwood, and $>\frac{1}{2}$ " diameter for red osier dogwood. If harvesting your own stakes, no more than 5% of the parent plant should be removed at any one time.

Stakes should be installed with a rubber mallet if the ground is soft enough, or by using a planting bar to create the hole in more compacted soils. The stake should be installed with no more than 3-6" remaining above the ground, and there should be good soil contact below ground for the length of the stake.

Adapted from DPR's Landscape, Horticulture and Urban Forestry BMPs (1999) and King County Water and Land Resources Bulletin titled "Live Stake Cutting and Planting Tips"

Table 6.1. Recommended Species List for Planting Forest Areas - Xeric/Shady Palette

	Species	Common Name
OVERSTORY		
Early seral	<i>Abies grandis</i>	grand fir
	<i>Acer macrophyllum</i>	bigleaf maple
	<i>Alnus rubra</i>	red alder
	<i>Pseudotsuga menziesii</i>	Douglas fir
	<i>Rhamnus purshiana</i>	cascara
Later seral	<i>Cornus nuttallii</i>	Pacific dogwood
	<i>Taxus brevifolia</i>	western yew
	<i>Tsuga heterophylla</i>	western hemlock
UNDERSTORY		
Early seral	<i>Acer circinatum</i>	vine maple
	<i>Corylus cornuta</i>	beaked hazelnut
	<i>Holodiscus discolor</i>	oceanspray
	<i>Lonicera ciliosa</i>	orange honeysuckle
	<i>Mahonia aquifolium</i>	tall Oregon grape
	<i>Mahonia nervosa</i>	low Oregon grape
	<i>Philadelphus lewisii</i>	mock orange
	<i>Polystichum munitum</i>	sword fern
	<i>Ribes sanguineum</i>	red flowering currant
	<i>Rosa gymnocarpa</i>	baldhip rose
	<i>Rubus parviflorus</i>	thimbleberry
	<i>Symphoricarpos albus</i>	snowberry
Later seral	<i>Gaultheria shallon</i>	salal
	<i>Oemleria cerasiformis</i>	Indian plum
	<i>Rhododendron macrophyllum</i>	Pacific rhododendron
	<i>Vaccinium ovatum</i>	evergreen huckleberry
	<i>Vaccinium parvifolium</i>	red huckleberry
GROUND COVER		
	<i>Achlys triphylla</i>	vanilla leaf
	<i>Aruncus dioicus</i>	goat's beard
	<i>Dicentra formosa</i>	bleeding heart
	<i>Linnaea borealis</i>	twinsflower
	<i>Pteridium aquilinum</i>	bracken fern
	<i>Trillium ovatum</i>	western trillium

Table 6.2. Recommended Species List for Planting Forest Areas - Mesic/Shady Palette

	Species	Common Name
OVERSTORY		
Early seral	<i>Abies grandis</i>	grand fir
	<i>Cornus nuttallii</i>	Pacific dogwood
	<i>Fraxinus latifolia</i>	Oregon ash
	<i>Prunus emarginata</i>	bitter cherry
	<i>Rhamnus purshiana</i>	cascara
	<i>Thuja plicata</i>	western red cedar
Later seral	<i>Tsuga heterophylla</i>	western hemlock
	<i>Taxus brevifolia</i>	western yew
UNDERSTORY		
Early seral	<i>Acer circinatum</i>	vine maple
	<i>Cornus sericea</i>	red-osier dogwood
	<i>Gaultheria shallon</i>	salal
	<i>Lonicera ciliosa</i>	orange honeysuckle
	<i>Lonicera involucrata</i>	black twinberry
	<i>Mahonia nervosa</i>	low Oregon grape
	<i>Polystichum munitum</i>	sword fern
	<i>Rosa nutkana</i>	Nootka rose
	<i>Rubus parviflorus</i>	thimbleberry
	<i>Rubus spectabilis</i>	salmonberry
Later seral	<i>Sambucus racemosa</i>	red elderberry
	<i>Vaccinium ovatum</i>	evergreen huckleberry
	<i>Vaccinium parvifolium</i>	red huckleberry
GROUND COVER		
	<i>Aruncus dioicus</i>	goat's beard
	<i>Asarum caudatum</i>	wild ginger
	<i>Athyrium filix-femina</i>	lady fern
	<i>Blechnum spicant</i>	deer fern
	<i>Claytonia perfoliata</i>	miner's lettuce
	<i>Clintonia uniflora</i>	queen's cup
	<i>Cornus unalaschkensis</i>	bunchberry
	<i>Corydalis scouleri</i>	Scouler's corydalis
	<i>Dicentra formosa</i>	Pacific bleeding heart
	<i>Hydrophyllum tenuipes</i>	Pacific waterleaf
	<i>Linnaea borealis</i>	twinflor
	<i>Maianthemum dilatatum</i>	false lily-of-the-valley
	<i>Smilacina racemosa</i>	false Solomon's seal
	<i>Streptopus amplexifolius</i>	clasping twisted stalk
	<i>Tellima grandiflora</i>	fringecup
	<i>Tiarella trifoliata</i>	foam flower
	<i>Tolmiea menziesii</i>	youth-on-age
	<i>Trillium ovatum</i>	western trillium
	<i>Viola sempervirens</i>	trailing yellow violet

Table 6.3. Recommended Species List for Planting Open Areas - Xeric/Sunny Palette

	Species	Common Name
OVERSTORY		
Early seral	<i>Abies grandis</i>	grand fir
	<i>Arbutus menziesii</i>	Pacific madrone
	<i>Pinus contorta</i> var. <i>contorta</i>	shore pine
	<i>Pseudotsuga menziesii</i>	Douglas fir
	<i>Quercus garryana</i>	Garry oak
Later seral	<i>Cornus nuttallii</i>	Pacific dogwood
UNDERSTORY		
Early seral	<i>Acer douglasii</i>	Douglas maple
	<i>Amelanchier alnifolia</i>	western serviceberry
	<i>Arctostaphylos columbiana</i>	hairy manzanita
	<i>Ceanothus velutinus</i>	snowbrush
	<i>Corylus cornuta</i>	beaked hazelnut
	<i>Holodiscus discolor</i>	oceanspray
	<i>Lonicera ciliosa</i>	orange honeysuckle
	<i>Philadelphus lewisii</i>	mock orange
	<i>Prunus virginiana</i>	chokecherry
	<i>Rosa gymnocarpa</i>	baldhip rose
	<i>Sambucus cerulea</i>	blue elderberry
	<i>Symphoricarpos albus</i>	common snowberry
Later seral	<i>Gaultheria shallon</i>	salal
	<i>Oemleria cerasiformis</i>	Indian plum
	<i>Polystichum munitum</i>	sword fern
	<i>Ribes sanguineum</i>	red flowering currant
	<i>Vaccinium ovatum</i>	evergreen huckleberry
GROUND COVER		
	<i>Achillea millefolium</i>	yarrow
	<i>Anaphalis margaritacea</i>	pearly everlasting
	<i>Arctostaphylos uva-ursi</i>	kinnikinnick
	<i>Epilobium angustifolium</i>	fireweed
	<i>Linnaea borealis</i>	twinflower
	<i>Pteridium aquilinum</i>	bracken fern

Table 6.4. Recommended Species List for Planting Open Areas - Mesic/Sunny Palette

	Species	Common Name
OVERSTORY		
Early seral	<i>Abies grandis</i>	grand fir
	<i>Acer macrophyllum</i>	bigleaf maple
	<i>Alnus rubra</i>	red alder
	<i>Crataegus douglasii</i>	black hawthorn
	<i>Fraxinus latifolia</i>	Oregon ash
	<i>Malus fusca</i>	Pacific crabapple
	<i>Pinus contorta</i> var. <i>contorta</i>	shore pine
	<i>Populus balsamifera</i>	black cottonwood
	<i>Populus tremuloides</i>	quaking aspen
	<i>Prunus emarginata</i>	bitter cherry
	<i>Prunus virginiana</i>	chokecherry
	<i>Pseudotsuga menziesii</i>	Douglas fir
	<i>Rhamnus purshiana</i>	cascara
	Later seral <i>Cornus nuttallii</i>	Pacific dogwood
	<i>Thuja plicata</i>	western red cedar
UNDERSTORY		
Early seral	<i>Amelanchier alnifolia</i>	serviceberry
	<i>Corylus cornuta</i>	beaked hazelnut
	<i>Holodiscus discolor</i>	oceanspray
	<i>Lonicera involucrata</i>	black twinberry
	<i>Physocarpus capitatus</i>	Pacific ninebark
	<i>Ribes sanguineum</i>	red-flowering currant
	<i>Rosa nutkana</i>	Nootka rose
	<i>Rosa pisocarpa</i>	clustered wild rose
	<i>Rubus parviflorus</i>	thimbleberry
	<i>Rubus spectabilis</i>	salmonberry
	<i>Salix lucida</i> ssp. <i>lasiandra</i>	Pacific willow
	<i>Salix sitchensis</i>	Sitka willow
	<i>Sambucus racemosa</i>	red elderberry
	<i>Symphoricarpos albus</i>	snowberry
	Later seral <i>Acer circinatum</i>	vine maple
Later seral	<i>Gaultheria shallon</i>	salal
	<i>Polystichum munitum</i>	sword fern
	GROUND COVER <i>Athyrium filix-femina</i>	lady fern
	<i>Dicentra formosa</i>	Pacific bleeding-heart
	<i>Maianthemum dilatatum</i>	false lily-of-the-valley
	<i>Pteridium aquilinum</i>	bracken fern
	<i>Viola</i> spp.	violet

Table 6.5. Native Plant Species and Microclimate Requirements

Table format and information is adapted from and informed by the following documents: King County DDES Sensitive Area Mitigation Guidelines Habitat Worksheet (1999); Ecology Publication #93-17 "Restoring Wetlands in Washington" by Stevens and Vanbianchi (1993); Flora of the PNW (Hitchcock & Cronquist); Plants of the PNW Coast (Pojar & MacKinnon); Wetland Plants of Western WA (Cooke); Guidelines for Bank Stabilization Projects and Surface Water Design Manual (King County); Proceedings of the Puget Sound Wetlands and Stormwater Management Research Study (9/26/96); Natural Vegetation of Oregon and Washington (Franklin and Dyrness); and field observations.

Table Abbreviations

Indicator Status:

- OBL Obligate wetland plants that almost always occur in wetlands (estimated probability 99%) under natural conditions.
- FACW Facultative wetland plants usually occur in wetlands (estimated probability 67-99%) but occasionally are found in non-wetlands.
- FAC Facultative plants are equally likely to occur in wetlands (estimated probability 34-66%) or non-wetlands
- FACU Facultative upland plants usually occur in non-wetlands but occasionally occur in wetlands (estimated probability 1-33%)
- NI No indicator status assigned

Light Needs:

SI=Shade Intolerant
SD=Shade Dependent

ST=Shade Tolerant
HA=Highly Adaptable

Site Placement:

X=Drier (Xeric)Upland
M=Moister (Mesic)Upland

WE=Wetter
SS=Saturated
Soils
SW=Shallow
Water

Trees							
Scientific Name	Common Name	Indicator Status	Max Ht.	Light Needs	Site Placement	Spacing	Comments
<i>Abies grandis</i>	grand fir	FACU-	125'	SI-ST	X	12-15'	Best conifer for soil binding roots
<i>Acer macrophyllum</i>	big leaf maple	FACU+	100'	SI-ST	M,X	12-15'	Seral/sprouter - shallow rooter
<i>Alnus rubra</i>	red alder	FAC	80'	SI-ST	M,X	5-10'	Seral, sprouter & spreader
<i>Arbutus menziesii</i>	Pacific madrone	UPL	80'	SI	X	12-15'	Likes drier, coastal: slow-grower
<i>Cornus nuttalli</i>	Pacific dogwood	UPL	70'	ST	M	10-15'	Understory or forest edge tree
<i>Fraxinus latifolia</i>	Oregon ash	FACW	80'	SI-ST	WE,SS	12-15'	Requires flat, damp soils
<i>Picea sitchensis</i>	Sitka spruce	FAC	230'	SI	WE,SS	12-15'	Wettest conifer
<i>Pinus contorta</i>	shore pine	FAC	60'	HA	WE,M,X	10-15'	Tolerates poor soil
<i>Populus tremuloides</i>	quaking aspen	FAC+	75'	SI	X	5-10'	Seral in montane
<i>Populus trichocarpa</i>	black cottonwood	FAC	200'	HA	WE,SS,M	10-15'	Seral; sprouter
<i>Prunus emarginata</i>	bitter cherry	FACU	50'	SI	M	5-10'	Seral in mesic conditions
<i>Pseudotsuga menziesii</i>	Douglas fir	FACU	300'	SI	M,X	12-15'	Driest conifer-seral, fast grower
<i>Quercus garryana</i>	Garry oak	UPL		SI	X	12-15'	
<i>Taxus brevifolia</i>	Pacific yew	NI [80'	ST-SD	M	12-15'	Very slow growing
<i>Thuja plicata</i>	western red cedar	FAC	230'	SD	SS,WE,M	12-15'	Basic to PNW & wetlands
<i>Tsuga heterophylla</i>	western hemlock	FACU-	200'	SD	X, M	12-15'	Dry conifer, needs lots of organic in soil

Shrubs							
Scientific Name	Common Name	Indicator Status	Max Ht.	Light Needs	Site Placement	Spacing	Comments
<i>Acer circinatum</i>	vine maple	FAC-	25'	SD	M,X	6-10'	Needs canopy shade or lots of moisture.
<i>Amelanchier alnifolia</i>	serviceberry	FACU	20'	SI	X	6-10'	Edge-loving
<i>Ceanothus sanguineus</i>	redtsem ceanothus	UPL	6'	SI	X	5-8'	Commonly seral after fire, deciduous, nitrogen-fixer
<i>Ceanothus velutinus</i>	snowbrush	UPL	10'	SI	X	5-8'	Commonly seral after fire, evergreen, nitrogen-fixer
<i>Cornus sericea</i>	red-osier dogwood	FACW+	20'	ST	WE,SS,M	5-8'	Takes sun if it has lots of moisture
<i>Corylus cornuta</i>	hazelnut	FACU	15'	ST	X	4-6'	Good wildlife habitat
<i>Crataegus douglasii</i>	black hawthorn	FAC	20'	SI	M,X	5-8'	Typically on meadow hummocks
<i>Gaultheria shallon</i>	salal	FACU	7'	ST-SD	X	2-3'	Basic forest groundcover
<i>Holodiscus discolor</i>	ocean spray	UPL	10'	SI-ST	X	6-10'	Drought-tolerant, edge-loving
<i>Lonicera involucrata</i>	black twinberry	FAC+	10'	SI-ST	WE,SS,M	6-10'	Takes sun if has lots of moisture
<i>Mahonia aquifolium</i>	tall Oregon grape	UPL	4'	SD	X	3-4'	Dry sites
<i>Mahonia nervosa</i>	short Oregon grape	UPL	2'	ST-SD	X	2-3'	Dry sites
<i>Malus fusca</i>	western crabapple	FACW	35'	SI-ST	WE,M	5-8'	Edges
<i>Oemleria cerasiformis</i>	Indian plum	FACU	15'	SD	M,X	4-6'	Sub-canopy
<i>Oplopanax horridus</i>	Devil's club	FAC+	7'	ST	WE,M	4-6'	Needs good drainage, forms thickets
<i>Philadelphus lewisii</i>	mock orange	UPL	10'	SI-ST	M,X	4-6'	Needs good drainage
<i>Physocarpus capitatus</i>	Pacific ninebark	FACW-	20'	SI-ST	M,X	5-8'	Needs good drainage
<i>Prunus virginiana</i>	choke cherry	FACU	20'		X	5-8'	Native to the whole US
<i>Rhamnus purshiana</i>	cascara	FAC-	30'	ST-SD	M	6-10'	Found in most wetlands
<i>Ribes bracteosum</i>	stink currant	FAC	10'	ST	M	5-8'	Transition
<i>Ribes lacustre</i>	prickly currant	FAC+	7'	ST	M	4-6'	Can take drought
<i>Ribes sanguineum</i>	red-flowering currant	UPL	7'	SI	M,X	4-6'	Doesn't form thickets!
<i>Rosa gymnocarpa</i>	wood rose	FACU	7'	ST	X	3-4'	Tough, hardy
<i>Rosa nutkana</i>	Nootka rose	FAC	10'	ST	SS,M	3-4'	Rapid volunteer on damp soil
<i>Rosa pisocarpa</i>	clustered rose	FAC	7'	ST	WE,SS,M	3-4'	Will hybridize with nootka rose
<i>Rubus leucodermis</i>	black raspberry	UPL	10'	ST	X	6-10'	Good buffer planting
<i>Rubus parviflorus</i>	thimbleberry	FAC-	10'	SI	M,X	4-6'	Seral groundcover in clear-cuts, drought tolerant
<i>Rubus spectabilis</i>	salmonberry	FAC+	15'	HA	WE,M	4-6'	Takes sun if has lots of moisture
<i>Salix geyeriana</i>	Geyer willow	FACW+	15'	SI	SW,WE	6-10'	Likes inundation, sluggish water, wet meadows

<i>Salix lasiandra</i>	Pacific willow	FACW +	50'	HA	WE,SS,M	6-10'	Common, tolerant, prefers riparian
<i>Salix scouleriana</i>	Scouler willow	FAC	35'	ST	SS,M	6-10'	Upland & wetland
<i>Salix sitchensis</i>	Sitka willow	FACW	25'	HA	WE,SS,M	6-10'	Common, tolerant
<i>Sambucus racemosa</i>	red elderberry	FACU	20'	HA	M	5-8'	tolerates sun, seral on clear-cuts
<i>Sorbus sitchensis</i>	Cascade mountain ash	FACU	15'	SI-ST	M	6-10'	Not to be mistaken for <i>S. aucuparia</i>
<i>Symphoricarpos albus</i>	snowberry	FACU	7'	SI	M,X	3-4'	Common, tolerant
<i>Vaccinium ovatum</i>	evergreen huckleberry	UPL	5'	SD	M,X	4-6'	Prefers mature shade
<i>Vaccinium parvifolium</i>	red huckleberry	UPL	13'	SD	M,X	5-8'	Requires lots of organic matter

Sedges and Rushes							
Scientific Name	Common Name	Indi- cator Status	Max Ht.	Light Needs	Site Placement	Spacing	Comments
<i>Carex lenticularis</i>	shore sedge	FACW +	3'	SI	WE,SS	1.5'	From shore to high mountains
<i>Carex obnupta</i>	slough sedge	OBL	4.5'	ST	SW,WE,S S	1.5'	Extremely common
<i>Carex rostrata (utriculata)</i>	beaked sedge	OBL		SI-ST	SW,WE,S S	1.5'	Common
<i>Carex stipata</i>	sawbeak sedge	OBL	3'	SI-ST	SW,WE,S S	1.5'	Lowland to mid- montane
<i>Eleocharis acicularis</i>	spikerush	OBL	0.5'	SI	SW,WE	1.5'	Rhizomatous, lowland to mid-montane
<i>Eleocharis palustris</i>	common spikerush	OBL	0.5'	SI	SW,WE	1.5'	Rhizomatous, coastal to mid-montane
<i>Juncus acuminatus</i>	tapered rush	OBL	2'	SI	SW,WE	1.5'	Tolerant
<i>Juncus articulatus</i>	jointed rush	OBL	2'	SI	SW,WE	1.5'	Tolerant
<i>Juncus ensifolius</i>	dagger leaf rush	FACW	2'	SI	SW,WE,S S	1.5'	Lowland to mid- montane
<i>Juncus oxymeris</i>	pointed rush	FACW +	3'	SI	SW,WE,S S	1.5'	Lowland
<i>Scirpus acutus</i>	hardstem bulrush	OBL	6'	SI	SW,WE	1.5'	Tolerates up to 3' of water; common, hardy
<i>Scirpus microcarpus</i>	small-fruited bulrush	OBL	4.5'	SI-ST	SW,WE,S S	1.5'	Lowland to mid- montane, very common

Grasses							
Scientific Name	Common Name	Indi- cator Status	Max Ht.	Light Needs	Site Placement	Spacing	Comments
<i>Alopecurus aequalis</i>	short-awn foxtail	OBL		SI-ST	SW,WE,S S	1.5'	Often submerged
<i>Alopecurus geniculatus</i>	water foxtail	OBL	1.5'	SI-ST	SW,WE,S S	1.5'	Often submerged, tolerant
<i>Beckmannia syzigachne</i>	American sloughgrass	OBL	2'	SI	WE,SS	1.5'	Good wildlife forage, lowland to mid-montane

<i>Calamagrostis canadensis</i>	bluejoint reedgrass	FACW+	3'	ST	WE,SS,M	1.5'	Rhizomatous, coastal to mid-montane
<i>Cinna latifolia</i>	wood reed	FACW	6'	ST	WE,SS,M	1.5'	Coastal to sub-alpine
<i>Deschampsia caespitosa</i>	tufted hairgrass	FACW	2'	SI	WE,SS,M	1.5'	Common, keystone species in wet meadows
<i>Elymus glaucus</i>	blue wildrye	FACU	2'	SI	X	1.5'	Very drought-tolerant, good wildlife forage
<i>Festuca idahoensis</i>	Idaho fescue	UPL	2.5'	SI	X	1.5'	Drought-tolerant
<i>Festuca occidentalis</i>	Western fescue	UPL	2.5'	SI	X	1.5'	Open areas, forest edges
<i>Festuca rubra</i> var. <i>rubra</i>	red fescue	FAC+	2.5'	SI	SS,M	1.5'	Common, tolerant
<i>Glyceria borealis</i> (<i>occidentalis</i>)	northern mannagrass	OBL	4'	ST	WE,SS	1.5'	Tolerates up to 3' of water
<i>Glyceria elata</i>	tall mannagrass	FACW+	4.5'	SD	WE,SS,M	1.5'	Prefers streamside
<i>Panicum occidentale</i>	western panic-grass	FACW		SI	WE,SS,M	1.5'	Coastal to sub-alpine

Ferns							
Scientific Name	Common Name	Indicator Status	Max Ht.	Light Needs	Site Placement	Spacing	Comments
<i>Athyrium filix-femina</i>	lady fern	FAC	6'	ST	SS,M	4-6'	Very common, tolerant
<i>Blechnum spicant</i>	deer fern	FAC+	2'	SD	M	2-4'	Needs shade, moisture, evergreen
<i>Dryopteris expansa</i>	wood fern	FACU	2'	SD	WE,SS,M	2-4'	Likes muddy soil
<i>Gymnocarpium dryopteris</i>	oak fern	FAC	16"	S	M	1.5-2'	Forms carpets
<i>Polystichum munitum</i>	western sword fern	FACU	4'	ST	M,X	4-6'	PNW basic; needs shade or moisture, evergreen
<i>Pteridium aquilinum</i>	bracken fern	FACU	5'	SI	X	2-4'	Seral on disturbed areas

Herbs and Groundcovers							
Scientific Name	Common Name	Indicator Status	Max Ht.	Light Needs	Site Placement	Spacing	Comments
<i>Achillea millefolium</i>	yarrow	UPL	1'	SI	X	1-1.5'	Self-seeds, robust, tolerant
<i>Anaphalis margaritacea</i>	pearly everlasting	UPL	1'	SI	X	1-1.5'	Robust, tolerant
<i>Arctostaphylos uva-ursi</i>	kinnikinnick	FACU-	1'	SI	X	1-1.5'	Slow grower - likes dry stony soil
<i>Aruncus dioicus</i>	goat's beard	FACU+	2'	ST	M,X	1-1.5'	Streamside, edges
<i>Caltha palustris</i>	marsh marigold	OBL	9"	ST	SW,WE	1-1.5'	Coastal
<i>Chimaphila umbellata</i> or <i>menziesii</i>	pipsissewa	UPL	10"	ST	M	1-1.5'	Needs organic soil
<i>Dicentra formosa</i>	bleeding heart	FACU*	1.5'	ST-SD	M,X	1-1.5'	Very common, tolerant
<i>Epilobium angustifolium</i>	fireweed	UPL	4'	SI	X	1-1.5'	Seral on clear-cuts, common, tolerant
<i>Fragaria vesca</i>	woodland strawberry	UPL	6"	SI	X	1-1.5'	Rapid spreader, evergreen
<i>Geum macrophyllum</i>	big-leaf avens	FACW-	3'	ST	WE,SS,M	1-1.5'	Common

<i>Heracleum lanatum</i>	cow parsnip	FAC+	6'	ST	WE,SS,M	1-1.5'	Likes riparian, self-seeds
<i>Hieracium albiflorum</i>	hawkweed	UPL	2'	HA	M,X	1-1.5'	common
<i>Hydrophyllum tenuipes</i>	Pacific waterleaf	NI	12"	ST-SD	M	1-1.5'	Wet forest groundcover
<i>Linnaea borealis</i>	twinline	FACU-	6"	ST	M,X	1-1.5'	Usually in forests, but seral on clear-cuts
<i>Lonicera ciliosa</i>	orange honeysuckle	UPL	15'	ST	M,X	1-1.5'	Trailing/climbingvine
<i>Lupinus polyphyllus</i>	big-leaf lupine	FAC+	3'	SI	X	1-1.5'	Seral, common, tolerant
<i>Lysichiton americanum</i>	skunk cabbage	OBL	10"	SD	SW,WE	1-1.5'	Common, typical PNW
<i>Maianthemum dilatatum</i>	wild lily of the valley	FAC	14"	ST	M,X	1-1.5'	Rapid spreader
<i>Mimulus guttatus</i>	yellow monkey flower	OBL	3'	SI	WE,SS,M	1-1.5'	Forms sheets near seeps
<i>Myosotis laxa</i>	small forget-me-not	OBL	15"	ST	WE,SS	1-1.5'	Uncommon, pretty
<i>Oenanthe sarmentosa</i>	water parsley	OBL	3'	ST	SW,WE,S S	1-1.5'	Common, hardy, good amphibian habitat
<i>Osmorhiza chilensis</i>	sweet cicely	NI	6"	ST-SD	X	1-1.5'	Very common in PNW forest
<i>Oxalis oregana</i>	wood-sorrel	NI	9"	ST	M,X	1-1.5'	Very rapid spreader, robust, highly tolerant
<i>Petasites frigidus</i>	coltsfoot	FACW-	20"	ST	WE,SS,M	1-1.5'	Rhizomatous, good spreader
<i>Polygonum persicaria</i>	lady's thumb	FACW	3'	SI-ST	SW	1-1.5'	Many species in this genus, good amphibian habitat
<i>Smilacina stellata</i>	Solomon's Star	FAC-	1.5'	ST	M	1-1.5'	Forms drifts near streams
<i>Stachys cooleyae</i>	Cooley hedge nettle	FACW	4'	SI-ST	M	1-1.5'	Common
<i>Tellima grandiflora</i>	fringecup	NI	2'	ST	M	1-1.5'	Common, tolerant
<i>Tiarella trifoliata</i>	foamflower	FAC-	2'	ST	M	1-1.5'	Common, tolerant
<i>Tolmiea menziesii</i>	piggy-back plant	FAC	30"	SD	M	1-1.5'	Forms drifts near streams
<i>Trientalis latifolia</i>	western starflower	UPL	6"	ST	M	1-1.5'	Often found in clumps around trees
<i>Viola glabella</i>	stream violet	FACW +	7"	SI-ST	M	1-1.5'	Common, rapid spreader

6.6 Pruning

At SPMP pruning is a maintenance action that will primarily only be necessary in developed landscape areas. Pruning in natural areas is to be done mainly in the case of hazard trees that pose a threat to public safety. Pruning can produce strong, healthy, attractive plants, but only if done well. Prune for your level of expertise, for poorly pruned plants often become bigger problems than when left alone. Pruning can stimulate fruit production, invigorate the plant, promote growth, repair injury, and increase value of trees and shrubs. If plants are planted in the right plant then pruning is less of an issue, and many future pruning problems can be eliminated. Begin with removing the three D's: Dead, Diseased or Damaged wood. Use clean, sharp pruning tools including handsaws, loppers, pruners, and chainsaws.

Trees

Prune for Safety

- Remove branches that grow to low and could cause injury or property damage.
- Trim branches that interfere with site lines on streets or driveways.
- Remove branches that grow into utility lines.
- Remove or trim branches in natural areas that are a hazard to public safety.

Prune for Health

- Create a strong structure when tree is young.
- Remove dead, diseased or damaged branches to increase strength and longevity of trees.
- Thin crown to increase airflow and reduce pest problems.
- Remove crossing and rubbing branches.
- Do not apply dressing to pruning wounds, as this may invite disease problems.

Prune for Aesthetics

- Enhance the natural form and character of the tree.
- Never 'top' trees. It is against DPR adopted Tree Policy (2001) to do so on public lands for views from private lands.

Shrubs

Prune for Health

- Follow principles of natural target pruning.
- Make cuts as close to the bud as possible.
- Do not make flush cuts.
- Do not leave stubs.

Prune for Aesthetics

- Enhance balanced, natural shape of shrub species.
- Remove crowded and crossing branches.
- Remove terminal bud to stimulate lower branching.
- Remove reverted shoots.
- Enhance flowering and fruiting.

6.7 Removing Plants

Plant removal outside of non-native control efforts is done primarily for the following reasons: poor tree architecture, summer branch drop, increased exposure, root loss, unstable rooting, girdling roots, leaning trees, unfavorable soil conditions, cracks, cankers, conks, seams, decay, cavities, and root and butt diseases. Trees in particular may present a risk because of old age, storm damage, poor structure, past construction activities or death of the tree. Derelict trees in natural areas that do not pose a hazard should be left standing.

If the tree is defective AND has a target, it is considered a hazard.

- Remove derelict trees which cannot be made safe or functional by corrective pruning.
- Remove trees that constitute a high hazard if no other prescription will eliminate the risk.
- Alert the community before tree removal begins, to provide opportunity for comment.

At times trees and shrubs may be removed for new park construction, access or other issues not related to the plant's viability. Cost and availability of funds for tree-spade work should be weighed against the cost of replacing the tree with a new smaller caliper tree. Establishment of larger trees is often less successful than planting a new one.

- Determine value of specimen to be transplanted, by appraisal, when considering replacement vs. transplanting.
- Transplant trees smaller than 10-12" in diameter with a large tree-spade.
- Transplant shrubs by carefully digging rootball and placing in pots.
- Do not let roots dry out.
- Remove plant material that is too large for the allotted space.
- Remove plant material that is diseased or dead and dispose off site.

Large woody debris and brush piles are critical elements that are often lacking in the habitat areas of the Park. When large trees have been removed, recycle as much of the parts of the woody debris on site as possible. Trunks and large branches that will not live sprout can be placed directly on the ground within any of the habitat areas, except for within the existing small wetlands on site. Brush (non-sprouting limbs and branches from the tree tops) can be used for wildlife brush piles scattered throughout the habitat zone of the park. Placing brush piles and large woody debris is appropriate within any upland or wetland habitat in the Park, except for directly into the small seasonally ponded wetlands.

CAUTION: Do NOT place trunks or large branches from any of the non-native *Populus* species found on site (Lombardy, white poplar, or their hybrids) directly on the ground. These species will live sprout from large woody debris kept in moist contact with soil. To use the remains of those species appropriately, prop them off the ground (on both ends) by placing the log on a 6-8" thick pieces of wood from non-invasive species (red alder, big leaf maple). In that manner, the native softwood will rapidly decompose from

direct contact with the soil while the potential live-sprouting log will dry out and become non-viable. It will eventually rest on the ground while the smaller pieces of wood decompose, resulting in large pieces of woody debris on the ground that pose no risk for sprouting and spreading unwanted invasive species. Smaller material, not used for brush piles, can be chipped and used as mulch.

6.8 Taking Care of Turf

Turf is the term applied to any lawn or grasses grown in the developed landscapes within the Park and is the traditional “green carpet” many visitors associate with parks. The wide variety of type of use indicates varied maintenance and management practices.

Maintenance

Mowing

Frequency

- Mow weekly from MARCH through OCTOBER; Bi-Weekly in FEBRUARY and NOVEMBER; and at least Monthly in DECEMBER and JANUARY.

Cutting Height

- Mow to a height of 2 to 2.5 inches (avoid removing more than 1/3 leaf blade height at any one time). Care should be taken in areas where tree roots protrude above the ground surface, and mower height should be raised whenever possible to avoid excessive root damage.

Mulch Mowing

- Do not remove grass clippings from mowed turf areas.
- Alternate mowing patterns to avoid ruts and compaction from the wheels.
- Avoid driving on frozen turf.
- Avoid driving on wet ground where ruts will remain.

Trimming

- Use walk- behind mowers and line trimmers where site cannot be accessed by riding mowers, and around trees to avoid trunk damage from riding mowers.

Edging

- Edge 2 to 4 times per year, depending on the maintenance standard for the site.

Cultural Care

Fertilization

- Soil test routinely fertilized turf on a 4-year cycle.
- Provide turf fertilizer 5-1-4 NPK unless otherwise indicated by soil tests.
- Apply approximately 1 lb. of N per 1000 square feet.
- Fertilizers N should be approx. 50% water insoluble N preferable with some organic sources.
- Avoid applications during heavy rainfall to avoid runoff.
- Avoid applications in very hot weather.

- Irrigation systems should be operational before growing season applications.
- Mark sprinkler heads to avoid damaging them during truck applications.
- Add micronutrients and lime as soil tests indicate.
- Use site specific fertilizers, such as organic fertilizer near streams, wetlands, and shorelines (all riparian areas).

Irrigation

- Apply approximately one inch of water per week.
- Monitor auto irrigation effectiveness on a weekly basis.

Aeration

- 2 to 3 times per year using .75 inch hollow tines.
- Best periods: March/April, late June, late August.
- Make two passes at 90 degree angles.

Top Dressing

- Use 80% coarse sand and 20% composted organic material.
- Most effective when done lightly and frequently.
- Apply ¼ inch, each application.
- Monthly applications in heavy wear areas during peak seasons.

Overseeding

- Overseed entire area at least once per year.
- Overseed in fall and slicer seed in spring.
- Overseed 5 lb. / 1000 square feet.
- Site characteristics, usage, and maintenance practices guide seed selection. Ideal sites (full sun, good drainage, reasonable fertility) are suited for perennial ryegrass blends. Lawns that are in partial shade or on poorly drained sites should be seeded with mixes of perennial rye and fescues. Avoid Kentucky Bluegrass.

Site Standards

Prominent Irrigated Lawn Areas

These are high visibility or high use landscaped. Examples are: community center lawns; popular picnic/sunbathing areas; lawns adjacent to busy arterials.

Fertilization: 5-1-4 NPK ratio at 2 to 6 lb. N per year applied in 3 to 4 applications. Only organic fertilizers should be used near riparian areas.

Aeration: 2 to 3 times per year with conventional 0.75" hollow tines.

Overseeding: Once per year at 5 lb. per 1000 sq. Monthly applications in heavy wear areas.

General Irrigated Lawn Areas

Fertilization: apply 5-1-4 NPK ratio at 1 to 2 lb. N per year applied in 1 to 2 applications. Only organic fertilizers should be used near riparian areas.

Aeration: 1 to 2 times per year with conventional 0.75" hollow tines.

Overseeding: as needed, in April/May and October.

Non-Irrigated Lawn Areas

Fertilization: apply 5-1-4 NPK ratio once October/November, only organic fertilizers should be used near riparian areas.

Overseeding: as needed, in October.

Steep Slopes

Leave unmowed or mow only once or twice per year. Replace existing slope vegetation with “low grow” turf cultivars or woody groundcovers.

Soil Based Athletic Fields

Maintain as general irrigated lawn unless there is exceptionally high usage.

Fertilization: apply 5-1-4 NPK ratio at 2 to 6 lb. N per year applied in 3 to 4 applications.

Aeration: 2 to 3 times per year with conventional 0.75” hollow tines.

Overseeding: Once per year at 5 lb. per 1000 sq. ft or about 375 lb. per soccer field.

Monthly in heavy wear areas such as goal mouths through the playing season.

Bathing Beaches

Fertilization: apply 5-1-4 NPK ratio at 2 to 6 lb. N per year applied in 3 to 4 applications, only organic fertilizers should be used near riparian areas.

Aeration: 2 to 3 times per year with conventional 0.75” hollow tines.

Overseeding: Once per year at 5 lb. per 1000 sq. ft. Monthly applications in heavy wear areas.

Design and Construction Issues

Construct turf areas with a minimum slope of 2% to promote surface drainage and a maximum of 25% to allow riding mowers to safely access the areas.

6.9 Three Year Establishment Care

All new plantings require follow-up care for a period of three years that is more intensive and frequent than plants that are already established. Main components of this three year care program are: mulching, watering, and weeding. One time maintenance actions that are project dependent are things like removing tree stakes and inorganic sheet or fabric mulch. A three year calendar for these actions is shown below. Detailed instructions on how to perform these maintenance actions can be found in this section under the title of the specific practice, i.e. “Mulching” (Section 6.4). Once the three year period is over and the plantings have established, care of these planted areas should be incorporated into the regular ongoing maintenance within the management area that they are located.

Three Year Establishment Care Calendar

Action	Month											
	J	F	M	A	M	J	J	A	S	O	N	D
At Time of Installation												
Mulching												
Watering												

6.10 Watering

Watering is the key to plant survival. Seattle gets an average of 39 inches of rain each year, but only 13 of those inches fall during the growing season. This is why summer watering is so important, particularly for plant installations in the first three years of establishment.

Water management is the term for efficient use of supplemental irrigation water required for many landscapes in Puget Sound. By controlling the application of water for irrigation, water management conserves this resource, reduces urban runoff and saves money. For most efficient watering, establishment of an irrigation infrastructure for areas that require regular watering is recommended. Planning for temporary or permanent irrigation should be part of all future development or planting plans within SPMP for both developed and natural area landscapes to ensure adequate and efficient watering. Water sources for temporary irrigation during 3 year establishment care of newly planted areas could be watering trucks, fire hydrants (permit required), or existing permanent irrigation lines.

Irrigate the following Park areas:

- Athletic fields.
- Bathing beaches.
- Hi-use or high-visibility turf planting.
- Hi-use or high-visibility shrub and annual plant beds.
- Special gardens.
- Newly installed landscapes.

Do NOT irrigate:

- Low-use or low-visibility park turf areas.
- Turf meadow areas.
- Natural areas - except during period of establishment.

In general:

- Established trees and shrubs do not require supplemental watering except during periods of extreme drought.
- Water valuable, specimen trees and high-use or high-visibility planting beds during periods of extreme drought.
- Water new trees and shrubs thoroughly at planting.
- Water new trees and shrubs (weekly at least 1") during first two summers, tapering watering (to ½" weekly) in the third year.
- Modify turf irrigation around established trees to accommodate the water requirements of the trees.
- Do not direct water spray on tree trunks.

See Seattle DPR Landscape, Horticulture and Urban Forestry Best Management Practices Manual (BMPs) (1999) for additional information on irrigation systems. See Planting

(Section 6.5), and 3 Year Establishment Care (Section 6.9) for instructions on watering newly installed trees and shrubs.

6.11 Weeding and Invasive Control

Weeding and controlling invasives are necessary as an ongoing maintenance action throughout the Park in developed landscaped areas as well as natural areas. In addition, most natural area planting projects will include initial removal and ongoing control of invasives as a major component of the project, as will reclamation and renovation projects in the historic landscape areas of the Park. Invasive control is also an important part of 3-year establishment care for all newly planted areas throughout the Park. The most commonly occurring and problematic non-native invasive species in the Park are listed below with a brief description of their characteristics, some information about where each species is typically found in the Park, and some recommended eradication and control methods for that particular species. Recommendations and protocols (including herbicide use) are in accordance with DPR's 1999 Landscape, Horticulture, and Urban Forestry BMPs), and focus on using an integrated pest management approach characterized by a combination of control and removal methods.

Generally, the most effective long-term control of invasive species is achieved by using a combination of control methods, reducing site disturbance, and establishing healthy native plant communities. All control efforts should be directed over time towards establishing and maintaining more sustainable plant communities. To this end, weedy species and infestations that pose the greatest threat to healthy desirable plant communities are those that should be targeted. In addition, to keep the weed control workload at the most reasonable level possible, new infestations should be targeted for control before they become widespread or well-established, and the extent of current invasion should be controlled at or below existing levels for those species that threaten to spread.

Thus, invasive control should focus on those species and specific infestations that are: 1) the fastest-growing, 2) the least established but potentially threatening, 3) the most disruptive to functional habitat, and 4) listed noxious weeds with mandated control.

Large woody debris and brush piles are critical elements that are often lacking in the habitat areas of the Park. When large trees have been removed, recycle as much of the parts of the woody debris on site as possible. Trunks and large branches that will not live sprout can be placed directly on the ground within any of the habitat areas, except for within the existing small wetlands on site. Brush (non-sprouting limbs and branches from the tree tops) can be used for wildlife brush piles scattered throughout the habitat zone of the park. Placing brush piles and large woody debris is appropriate within any upland or wetland habitat in the Park, except for directly into the small seasonally ponded wetlands. Other plant debris not appropriate for wildlife features should be disposed of following current DPR protocol. In accessible areas (developed landscapes accessed by roads), debris can be removed from the site. In more remote natural areas debris can be piled or stacked off the ground and left on-site to decompose.

The following text describes in detail how to remove each of the identified non-native invasive plants or noxious weeds identified as a significant presence at SPMP. At the end of the text section are a series of tables describing specifics such as removal quantities, seasonal timing, replacement ratios, and removal intervals for each targeted species. Non-native invasive species that are not specified in these tables can be removed without limitations as appropriate.

Tree Species (canopy species >20' tall at maturity)

Non-native poplar (*Populus alba*, *Populus nigra*, and cultivars and hybrids)

Lombardy poplar, white poplar, and non-native poplar hybrids are the most prevalent invasive tree species in the Park. They are found throughout the Park as components of existing forest patches, and in upland meadow and tree/shrub savannah areas. This genus is known for its stump sprouting and suckering, so removals must include treatment of the cut stump with an herbicide to be effective. Removal can proceed incrementally as resources for removal and re-planting are available. Although these trees are invasive non-natives, and there are a significant number of native canopy trees that will remain to provide lost functions, these trees do provide limited habitat function (mainly perching areas and insect production), and should therefore be removed incrementally as detailed in Table 6.8.

Removal of these trees to halt their spread is a high priority. Trees should be cut, and the stumps immediately painted with an appropriate herbicide mixed with a water-soluble dye. On large stumps, paint only the outer 2-3"; on stumps 3" or less in diameter, paint the entire stump. A 25% solution of Garlon 3A is recommended in upland areas away from aquatic resources e.g. shoreline, wetlands. Within 100' of aquatic resources, a 50% solution of Rodeo in a water base (no surfactant) is recommended. Treated cut stumps should be checked for resprouts every 2 to 6 months for the first year after cutting and re-treated if necessary. Logs and limbs can be used in natural areas for habitat features. They should be stored off the ground for 2 years or until non-viable, before they are placed in natural areas to avoid any resprouting.

Norway maple (*Acer platanoides*)

Norway maples are planted as landscape specimen trees in various areas of the Park, namely in the Historic District and the shoreline areas in the vicinity of the swimming beach and bathrooms. They are also found on the low ridge on the south side of the tennis courts. This is a less problematic and less prevalent species at SPMP than non-native poplar, but does produce prolific seed, and is known to be a very opportunistic plant in other settings where it has had more of a chance to gain a foothold in native forests.

Removal and replacement of this species is recommended (see Table 6.8), but at a lower priority level than the poplars. Trees should be cut, and the stumps immediately painted with an appropriate herbicide mixed with a water-soluble dye.

On large stumps, paint only the outer 2-3"; on stumps 3" or less in diameter, paint the entire stump. A 25% solution of Garlon 3A is recommended in upland areas away from aquatic resources e.g. shoreline, wetlands. Within 100' of aquatic resources, a 50% solution of Rodeo in a water base (no surfactant) is recommended. Treated cut stumps should be checked for resprouts every 2 to 6 months for the first year after cutting and re-treated if necessary. Logs and limbs can be used in natural areas for habitat features. They should be stored off the ground for 2 years or until non-viable, before they are placed in natural areas to avoid any resprouting, and no seeds should remain on branches placed as habitat features.

Shrub Species (<20' tall at maturity)

Laurel (Prunus laurocerasus, Prunus lusitanica), English holly (Ilex aquifolium)

Laurel and holly are broad-leaved evergreen shrubs that are spread readily by birds due to their prolific and tasty fruit. They also sucker and re-sprout vigorously. They prefer at least partial shade and are generally found in upland forest in the understory, or along forest edges. At SPMP these species are most prevalent in the wooded portions of Promontory Point, and are also found in the Forest Remnant Zone along NE 65th St.

Removal of these species should be a high priority because they are not yet widespread, and occur mostly as individual plants rather than as large thickets. Young plants that are small enough can be hand-pulled, but most removals of larger plants that cannot be removed with the roots intact will probably be done most effectively by a combination of mechanical means and herbicide. A 25% solution of Garlon 3A is recommended in upland areas away from aquatic resources e.g. shoreline, wetlands. Within 100' of aquatic resources, a 50% solution of Rodeo in a water base (no surfactant) is recommended. Herbicide should be mixed with a water-soluble dye. Several cut and paint methods can be used:

- 1) Cut shrub to a stump at or near ground level and paint entire cut surface immediately with herbicide.
- 2) Cut shrub to a stump at or near chest level and with a portable drill, make 1/8" diameter holes 1" deep into the stump from the outer sides all the way around the circumference of the stump every 2". Then inject herbicide with syringe directly into each hole. If standing dead brush is desired, this method can be used without cutting the plant to a stump.
- 3) Girdle the standing plant by making a series of downward overlapping cuts all the way around the trunk (also called frilling), leaving the chips attached to the trunk at the base of the cut. Then paint herbicide onto fresh cuts. This technique should be used before fruit production so that standing dead plant does not have fruit on it.

Treated cut stumps should be checked for resprouts every 2 to 6 months for the first year after cutting and re-treated if necessary. If no herbicide is used, repeated cutting will be required to weaken and eventually kill the plant over time. This is a more

labor-intensive method and will require diligent follow-up visits over a period of at least several years to remove suckering growth resulting from initial cutting. Removal details can be found in Table 6.10.

Non-native Hawthorne (Crataegus sp.) and firethorn (Pyracantha)

Non-native hawthorne is a large tree-like shrub that spreads by suckering and by prolific fruit production that is excellent bird forage. It is found throughout the upland meadow and tree/shrub savannah areas at SPMP. Firethorn is present in the Park to a much more limited degree, in the Shoreline Zone north of the swim beach and to some degree along forest/meadow edges at Promontory Point. Both of these species provide important bird forage as well as cover and refuge for wildlife. For this reason, incremental removal and replacement of hawthorne is recommended (Table 6.9) so that over time this invasive species is replaced with natives that provide the same functions for wildlife without radical displacement occurring during this process. Removal of all firethorn that can be located is a high priority because it is still scarce in the Park.

Because hawthorne is a suckering species, the most effective removal technique for individual plants too large to allow removal of the entire plant with the roots intact will be to cut individual shrubs and apply herbicide directly to the cut surface to prevent resprouting. A 25% solution of Garlon 3A is recommended in upland areas away from aquatic resources e.g. shoreline, wetlands. Within 100' of aquatic resources, a 50% solution of Rodeo in a water base (no surfactant) is recommended. Herbicide should be mixed with a water-soluble dye. Several cut and paint methods can be used:

- 1) Cut shrub to a stump at or near ground level and paint entire cut surface immediately with herbicide.
- 2) Cut shrub to a stump at or near chest level and with a portable drill, make 1/8" diameter holes 1" deep into the stump from the outer sides all the way around the circumference of the stump every 2" or one hole for every 1" dbh. Holes should be drilled at a slight downward angle. Then inject herbicide with syringe directly into each hole. If standing dead brush is desired, this method can be used without cutting the plant to a stump.
- 3) Girdle the standing plant by making a series of downward overlapping cuts all the way around the trunk (also called frilling), leaving the chips attached to the trunk at the base of the cut. Then paint herbicide onto fresh cuts. This technique should be used before fruit production so that standing dead plant does not have fruit on it.

Treated cut stumps should be checked for resprouts every 2 to 6 months for the first year after cutting and re-treated if necessary. If no herbicide is used, repeated cutting will be required to weaken and eventually kill the plant over time. This is a more labor-intensive method and will require diligent follow-up visits over a period of at least several years to remove suckering growth resulting from initial cutting.

Ongoing control of shoots newly emerging from past fruit dispersal should occur with implementation of prescribed mowing regimen in meadow areas.

Himalayan Blackberry and Evergreen blackberry (Rubus procerus, R. laciniatus)

Both of these non-native blackberries are found in the Park, though Himalayan blackberry is by far most prevalent. Eradication and control methods for these two species are the same. Blackberry is found in upland areas throughout the Park, as an understory species along forest edges, and in dense monotypic stands in open meadow areas. Blackberry is shade-intolerant, so long-term control is linked to successful establishment of healthy native plant communities that will create undesirable conditions for this species. Removal methods include hand grubbing with root removal, repeated cutting or mowing, cutting and dabbing stubs with herbicide (cut and dab), or combinations of two or more of these techniques. Hand-grubbing is generally only a reasonable method for small areas, or for maintenance around trees or shrubs. If herbicide is used, a glyphosate herbicide is recommended – Roundup for upland areas and Rodeo for areas within 100’ of an aquatic resource. The method(s) chosen depends mainly on how bad the infestation is, and the available labor resources.

Removal, other than in areas with sparse occurrences and a relatively intact healthy existing plant community, should not be done unless subsequent replacement planting is planned. For sparse occurrences, hand-grubbing is recommended. Ongoing control of sparser occurrences in meadow and savannah areas and preservation of existing non-invaded areas should be achieved with implementation of prescribed mowing regimen in meadow areas. Removal of thickets will result in displacement of wildlife that may use these areas for cover and forage. Therefore, whenever possible removal work should accommodate wildlife by occurring after July 31st. Depending on the removal method chosen, this may not always be possible, and maximum removal effectiveness may take precedent over wildlife impacts. In general if herbicide is used, timing of its application should coincide with the time of year that the target plant is most actively growing and translocating resources to its roots to maximize herbicide effectiveness. For Himalayan blackberry, this is generally considered to be mid-summer during flowering. For removal of denser stands or thickets the following methods are recommended:

- 1) Mow or cut to the ground numerous times during the growing season (May-Oct) to reduce plant vigor. If combining with an herbicide treatment, do a late summer (July) cut and dab (herbicide) treatment on resprouts. Herbicide should be applied to fresh cuts immediately (within 30 min.) for most effective treatment. In fall, after final mowing, plant and apply double layer of cardboard sheet mulch covered with 4-6” of mulch. Note: This method, while effective, does not accommodate wildlife as much as other methods, and for this reason may not be preferred.

OR

- 2) Mow or cut to the ground late in the growing season (after July 31st), and immediately cover entire area with heavy weed fabric firmly stapled to the ground. In fall, cut slits in the fabric to install plants. After 2-3 years, remove fabric, handpull any resprouts, and apply double layer of cardboard sheet mulch covered with 4-6" of wood chips.

OR

- 3) Mow or cut to the ground late in the growing season (after July 1st) and either dab cut ends at that time, or cut and dab resprouts late in the summer when they appear.

Removal of large stands should be done incrementally (see Table 6.6), as these thickets provide both forage and good refuge and cover for wildlife. Native wildlife should have adjacent or nearby comparable habitat to take the place of what is removed. Blackberry that is not dense enough to be a monotypic thicket can be removed as part of meadow maintenance activities (mowing or handpulling) or as invasive control along edge habitat. In edge habitat where invasion is low and coverage is sparse it may be advisable to replant with native species to prevent re-colonization. This determination should be made on a site specific basis.

Scot's broom (Cytisus scoparius)

Scot's broom is found in open dry upland areas in the Park, established and colonizing in meadows and along forest edges. In areas where it is well-established, like blackberry it has formed monotypic stands or thickets. Scot's broom is shade-intolerant, so long-term control is linked to successful establishment of healthy native plant communities that will create undesirable conditions for this plant species. Scot's broom provides some cover and refuge for wildlife, but its habitat function is not high. It produces large quantities of self-dispersed, and long-lived seed. Removal of seed-producing age plants is the most labor intensive, but is important to reduce spread and seed accumulation. Removal and control of younger plants is easier because they can be hand-pulled or mowed, and is also important to keep the seed-producing population from expanding and becoming more widespread.

Thicket removal can be done incrementally as resources are available, and should not be done unless subsequent replacement planting is planned (see Table 6.7). Plants can be removed by mowing, hand-cutting individual plants, or manual removal and grubbing with shovels, weed wrenches or machinery, which may be the least desirable due to the soil disturbance and opportunity for improved broom seed germination and seedling emergence it causes. It may be desirable to strip the duff layer of seeds from the ground as part of the removal strategy. If this is the case, the plant removal method with the least disturbance to the soil should be used. Cutting should be done early in the summer when flowering has just started and should either be followed up by continued subsequent annual (or more often) cutting or by herbicide treatment (Roundup with water soluble dye) of cut stumps. Hand-pulling of smaller

infestations of young plants (3' tall and smaller) should be done when soil is moist and loose (spring).

Broom thickets could also be used as early establishment areas for later successional trees and shrubs. The basic concept is to underplant the thicket with desirable natives that will then form the foundation of the native community that will replace the broom. Once the installed plantings have established, broom can be removed by hand-cutting and removal of the roots or a cut and dab herbicide treatment.

Scots broom that is not dense enough to be a monotypic thicket can be removed as part of meadow maintenance activities (mowing or handpulling) or as invasive control along edge habitat. In edge habitat where invasion is low and coverage is sparse it may be advisable to replant with native species to prevent re-colonization. This determination should be made on a site specific basis.

English ivy (Hedera helix)

English ivy is a broadleaved evergreen found at SPMP in the forest groundlayer and climbing up tree trunks in upland forest areas, mainly Promontory Point, in the Forest Remnant Zone, and in selected portions of upland forest within the Habitat Zone (mostly at the south end of the Park). Ivy is shade-tolerant, and forms dense mats on the ground. Hand-pulling appears to be the most effective removal method for this plant. Any efforts to control ivy should initially target vines climbing into trees (see Table 6.12). Vines should be cut at shoulder height and again at the base of the tree all the way around the circumference of the tree. Cut vines should not be pulled down out of trees. A radius of at least 5' from the base of the tree all the way around the tree should also be cleared of ivy. Patches of ivy on the ground are best removed by hand-pulling and rolling into a mat. Removal of dense mats in the groundlayer should only be done if subsequent replanting is to be done. New planting areas should have an additional 10'-wide cleared strip around the edge. Removal of sparse occurrences of ivy, as can be found in portions of upland forest at the south end of the Habitat Zone, can be done without replacement planting. Control in these areas of low infestation should be prioritized to prevent further spread of this species.

Butterfly bush (Buddleja davidii)

Although this species is very desirable for attracting butterflies, it is also highly invasive. This plant is not prevalent in SPMP, so removal of individuals immediately when they appear is strongly recommended so that control is achieved before this species becomes widespread in the Park.

Clematis (Clematis vitalba)

Clematis is a woody invasive vine that is found in upland forest habitats. At SPMP, it occurs at Promontory Point and in the Forest Remnant Zone. It is usually seen up in the tree canopy and hanging below. Control of this species involves cutting the vine at the base near the ground in early summer before seed production occurs, and either grubbing out the root, or applying herbicide (Roundup with water soluble dye)

directly onto the surface of the cut stump. Dead top growth can be removed in fall or winter when vines have become brittle.

Herbaceous Species

Japanese knotweed (Polygnum cuspidatum)

Knotweed, or false bamboo, is an herbaceous perennial which forms large monotypic clumps upwards of 6-8' in height. It reproduces by seed and by rhizomes, which are very large and impossible to remove effectively by grubbing. It prefers moist soil conditions, and is typically found around wetlands, along streambanks, and in ditches. At SPMP, it currently has a limited presence mainly in a few isolated locations along the shoreline, and in a large stand on the northwest slope of Promontory Point just east of the USGS lab.

Immediate removal of these patches is strongly recommended to prevent further spread of this species because it is so persistent and dominant once established, and can be very difficult to eradicate. The most effective removal method is to exhaust its root reserves by repeated cutting during the growing season (at least 3 times between April and August), and then burying the entire area after the last cutting under well stapled heavy duty weed fabric or double layer industrial strength cardboard, overlain by a deep (8-12") layer of wood chips. If desired, selective application of Rodeo can be used on re-growth in late summer, and fabric/mulch installation can be delayed until late winter. Planting should not be done until after 2-3 years so that the fabric/mulch is not compromised while roots are still viable. See Table 6.11 for removal strategy details.

Purple loosestrife (Lythrum salicaria)

Purple loosestrife is a perennial herb with a well-developed taproot. It is found in wetlands, ditches, wet meadows, and along shorelines. It readily establishes and spreads in disturbed wet soils. At SPMP it is not common or widespread, so control efforts for this should be a high priority. Isolate and reduce/remove existing populations to prevent further spread, and monitor known wet areas in the Park. Bright magenta flowers on 2-5' tall stalks are easy to spot in late summer when the plant is in bloom. Existing known populations at SPMP are in the wetland north of the boat ramp along the promenade, in the wet area surrounding the abandoned building in the far north end of the Shoreline Zone, and in the wet area just south of the Dog Off Leash Zone on the north side of Kite Hill.

Control is achieved by eradicating these existing small populations. Hand-pull to remove the plant and its taproot in the summer before seed has set and when soils are still moist. Minimize disturbance to soil to avoid creating desirable conditions for more seedling establishment. Hand-pulling should continue regularly over 2-3 years until removal is thorough. If pulling is not effective, and populations remain small, cutting flower heads prior to seed production can be done to limit seed production. If herbicide is used (Rodeo), it should only be wick-applied to individual plants.

Field bindweed (Convolvulus arvensis)

Bindweed is a pervasive and very invasive perennial vine that winds around and overtops woody vegetation, and forms strangling mats over the top of low shrubs and understory. It thrives in disturbed sites, especially in sunny locations with moderately dry soils. It can be a particular problem in areas that have been newly cleared of other invasives (e.g. Himalayan blackberry) and replanted. It is most prevalent in the Promontory Point and Forest Remnant Zones. Control of this species will mostly be required in the course of carrying out 3 year maintenance care for newly planted sites. Regular hand-pulling and heavy mulching with wood chips during that 3 year establishment period should suppress this weed adequately. Less frequent follow-up weeding may also be needed after the three year period.

Canada thistle (Cirsium arvense)

Canada thistle is typically found in open disturbed sites and indeed at SPMP occurs mainly in meadow and savannah areas primarily in the Habitat Zone. It is shade intolerant and will not succeed in forested areas. It spreads mostly by windborne seed, but also reproduces by rhizomes or root segments. Control and removal of this species is done by hand-pulling in the case of small infestations, and mowing in the case of large stands. Hand-pulling should be done throughout summer, optimally in June, August and September, and if only done once should be timed before seed sets. Mowing as close to the ground as possible should be done when plants are in flower, but prior to seed set as well. Control efforts will likely have to be repeated for 2-3 years in any given area to be effective.

Listed Noxious Weeds

[Garlic mustard (Alliaria petiolata), Tansy ragwort (Senecio jacobaea) are known occurrences at SPMP]

Listed noxious weeds will be controlled as required by County Regulations and in accordance with DPR's BMPs.

Table 6.6. Blackberry Thickets (Himalayan, Evergreen)

Size of thicket	<50 sq. ft.	<50 sq. ft.	>50 sq. ft. to 1/10 acre	>1/10 acre
Landscape Setting	<i>Not</i> contiguous with shrub or forest habitat, <i>and not</i> in Shoreline Zone	Contiguous with shrub or forest habitat, <i>or</i> in Shoreline Zone	Any Zone, any M.A.	Any Zone, any M.A.
Removal Strategy	Remove entire thicket and return for follow-up removal of re-sprouts at least twice during the next 2 growing seasons.	Remove entire thicket and return for follow-up removal of re-sprouts at least twice during the next 2-3 growing seasons in conjunction with 3 year establishment care of new plantings.	Remove entire thicket and return for follow-up removal of re-sprouts at least twice during the next 2-3 growing seasons in conjunction with 3 year establishment care of new plantings.	Remove 1/3 total thicket area up to 1/10 acre and return for follow-up removal of re-sprouts at least twice during the next 2-3 growing seasons in conjunction with 3 year establishment care of new plantings.
Timing	Depends on strategy chosen but July 1 - April 1 is preferred	Depends on strategy chosen but July 1 - April 1 is preferred	Depends on strategy chosen but July 1 - April 1 is preferred	Depends on strategy chosen but July 1 - April 1 is preferred
Max. Annual Removal Area	unlimited	Limited only by resources for replanting and 3 year establishment care	Limited only by resources for replanting and 3 year establishment care	Not to exceed 1/3 total acreage of blackberry thickets of this size class in Park
Removal Interval	none	none	none	Every 3 years at the successful completion of 3 yr. establishment care period for previously removed area
Replanting Strategy	No replanting required	Replant removal area with trees and shrubs if contiguous to forest, shrubs if contiguous to shrub habitat. 3-yr. establishment care is required.	Replant removal area with trees and shrubs if contiguous to forest, shrubs if contiguous to shrub habitat. 3-yr. establishment care is required.	Replant removal area with trees and shrubs if contiguous to forest, shrubs if contiguous to shrub habitat. 3-yr. establishment care is required.
Replanting Densities	NA	Trees: 500/acre = 0.012/sq. ft. (min. 25-50% evergreen) Shrubs: 1200-2500/acre = 0.028-0.058/sq. ft. (shrub density depends on optimal spacing for species used)	Trees: 500/acre = 0.012/sq. ft. (min. 25-50% evergreen) Shrubs: 1200-2500/acre = 0.028-0.058/sq. ft. (shrub density depends on optimal spacing for species used)	Trees: 500/acre = 0.012/sq. ft. (min. 25-50% evergreen) Shrubs: 1200-2500/acre = 0.028-0.058/sq. ft. (shrub density depends on optimal spacing for species used)
Species Composition of Replacement Planting	NA	Xeric or Mesic plant community depending on microclimate conditions and existing vegetation at replanting location	Xeric or Mesic plant community depending on microclimate conditions and existing vegetation at replanting location	Xeric or Mesic plant community depending on microclimate conditions and existing vegetation at replanting location
Minimum Possible Time to Remove Max. Acreage in Size Class if Effort Optimally Funded	1 year	1 year	1 year	9 years

Table 6.7. Scot's Broom Thickets

Size of thicket	<50 sq. ft.	>50 sq. ft.
Landscape Setting	Any Zone, any M.A.	Any Zone, any M.A.
Removal Strategy	Remove entire thicket and return for follow-up removal of re-sprouts at least twice during the next 2 growing seasons.	Remove entire thicket and return for follow-up removal of re-sprouts at least twice during the next 2-3 growing seasons in conjunction with 3 year establishment care of new plantings.
Timing	Depends on strategy chosen but July 1 - April 1 is preferred	Depends on strategy chosen but July 1 - April 1 is preferred
Max. Annual Removal Area	unlimited	Limited only by resources for replanting and 3 yr. establishment care
Removal Interval	none	none
Replanting Strategy	No replanting required	Replant removal area with trees and shrubs. 3-yr. establishment care is required.
Replanting Densities	NA	Trees: 500/acre = 0.012/sq. ft. (min. 25-50% evergreen) and Shrubs: 1200-2500/acre = 0.028-0.058/sq. ft. (density depends on optimal spacing for species used)
Species Composition of Replacement Planting	NA	Xeric plant community
Minimum Possible Time to Remove Max. Acreage in Size Class if Effort Optimally Funded	1 year	1 year

Table 6.8. Non-native Poplar, Norway Maple

Removal Size	Saplings <15' ht. and/or <1" dbh	Canopy trees >15' ht. and/or >1" dbh
Landscape Setting	Any Zone, any M.A.	Any Zone, any M.A.
Removal Strategy	Remove entire group of saplings or individuals and return once yearly for 2-3 years to check for and control vegetative re-sprouting	Thin trees within existing stands and return once yearly to check for and control vegetative re-sprouting.
Removal Quantity	Limited only by resources for replanting and 3 year establishment care	Up to 1/3 the total number of stems in a given stand
Timing	Depends on strategy chosen but July 1 - April 1 is preferred	Depends on strategy chosen but July 1 - April 1 is preferred
Max. Annual Removal Quantity	Limited only by resources for replanting and 3 year establishment care	No more than 1/3 total number of target stems in the Park
Removal Interval	none	No more than 1/3 total stems every 5 years
Replanting Strategy	Replace lost aerial coverage with equal area of tree and shrub plant community around edges of nearest adjacent forest patches. At the time of planting, replacement community must equal or exceed lost aerial coverage. 3-yr. establishment care is required.	Replace lost aerial coverage with equal area of tree and shrub plant community around edges of nearest adjacent forest patches. At the time of planting, replacement community must equal or exceed lost aerial coverage. 3-yr. establishment care is required.
Replanting Densities	Trees: 500/acre = 0.012/sq. ft. (min. 25-50% evergreen) and Shrubs: 1200-2500/acre = 0.028-0.058/sq. ft. (shrub density depends on optimal spacing for species used)	Trees: 500/acre = 0.012/sq. ft. (min. 25-50% evergreen) and Shrubs: 1200-2500/acre = 0.028-0.058/sq. ft. (shrub density depends on optimal spacing for species used) OR An association of 6-10 plants per tree removed with at least 2 trees in each association
Species Composition of Replacement Planting	Xeric or Mesic plant community depending on microclimate conditions and existing vegetation at replanting location	Xeric or Mesic plant community depending on microclimate conditions and existing vegetation at replanting location
Minimum Possible Time to Remove Max. Quantity if Effort Optimally Funded	1 year	15 years

Table 6.9. Hawthorne

Removal Size	All sizes
Removal Strategy	Remove individuals and return once yearly in conjunction with 3 year establishment care to check for and remove re-sprouts.
Removal Quantity	Limited to removal that leaves immediately available nearby alternate habitat for displaced wildlife. Also limited by resources for replanting and 3 yr. establishment care
Landscape Setting	Any Zone, any M.A.
Timing	Depends on strategy chosen but July 1 - April 1 is preferred
Max. Annual Removal Quantity	Limited only by resources for replanting and 3 yr. establishment care
Removal Interval	none
Replanting Strategy	Replacement planting is necessary only where removed plants are in the mature shrub stage or at sapling ht. of >4'. Replace lost aerial coverage with equal area of tree and shrub plant community at removal location, OR around edges of nearest adjacent forest patches. 3-yr. establishment care is required.
Replanting Densities	Trees: 500/acre = 0.012/sq. ft. (min. 25-50% evergreen) and Shrubs: 1200-2500/acre = 0.028-0.058/sq. ft. (shrub density depends on optimal spacing for species used)
Species Composition of Replacement Planting	Xeric or Mesic plant community depending on microclimate conditions and existing vegetation at replanting location
Minimum Possible Time to Remove Max. Quantity if Effort Optimally Funded	1 year

Table 6.10. Firethorn, Laurel, Holly, Butterfly Bush

Removal Size	All sizes
Removal Strategy	Remove individuals and return once yearly to check for and remove re-sprouts in conjunction with 3 year establishment care.
Removal Quantity	Limited only by resources for replanting and 3 yr. establishment care
Landscape Setting	Any Zone, any M.A.
Timing	Depends on strategy chosen but July 1 - April 1 is preferred
Max. Annual Removal Quantity	Limited only by resources for replanting and 3 yr. establishment care
Removal Interval	3 years
Replanting Strategy	Replacement planting is necessary only where removed plants are in the mature shrub stage or at sapling ht. of >4'. Replace lost aerial coverage with equal area of tree and shrub plant community at removal location, OR around edges of nearest adjacent forest patches. 3-yr. establishment care is required.
Replanting Densities	Trees: 500/acre = 0.012/sq. ft. (min. 25-50% evergreen) and Shrubs: 1200-2500/acre = 0.028-0.058/sq. ft. (shrub density depends on optimal spacing for species used)
Species Composition of Replacement Planting	Xeric or Mesic plant community depending on microclimate conditions and existing vegetation at replanting location
Minimum Possible Time to Remove Max. Quantity if Effort Optimally Funded	1 year

Table 6.11. Japanese Knotweed

Size of Patch	Any size
Removal Strategy	Remove entire patch and return twice yearly during the next 2-3 growing seasons to check for and remove re-sprouts.
Landscape Setting	Any Zone, any M.A.
Timing	Depends on strategy chosen
Max. Annual Removal Area	Limited only by resources for follow-up control and replanting in year 2 or 3
Removal Interval	none
Replanting Strategy	No replanting and 3 year establishment care are to be done until control of invasion is complete (2-3 years). Replanting of entire removal area with trees and shrubs and 3 year care are required.
Replanting Densities	Trees: 500/acre = 0.012/sq. ft. and Shrubs: 1200-2500/acre = 0.028-0.058/sq. ft. (shrub density depends on optimal spacing for species used)
Species Composition of Replacement Planting	Mesic or moist plant community depending on microclimate conditions and existing vegetation
Minimum Possible Time to Remove Max. Acreage in Size Class if Effort Optimally Funded	1 year for initial removal, 2-3 years for replacement planting

Table 6.12. English Ivy

Size of Patch	Any size
Landscape Setting	Any Zone, any M.A.
Removal Strategy	Remove any size patch and return twice yearly during the next 2-3 growing seasons to check for and remove re-sprouts in conjunction with 3 year establishment care.
Timing	Depends on strategy chosen
Max. Annual Removal Area	Limited only by resources for replanting and 3 year establishment care
Removal Interval	none
Replanting Strategy	Replant cleared area with shrubs or trees and shrubs for any ivy removed from the ground. 3 year establishment care is required. Ivy can be cut from trees per described removal protocol without any replacement planting.
Replanting Densities	Trees: 500/acre = 0.012/sq. ft. Shrubs: 1200-2500/acre = 0.028-0.058/sq. ft.
Species Composition of Replacement Planting	Xeric or Mesic shade-tolerant community depending on microclimate conditions
Minimum Possible Time to Remove Max. Acreage in Size Class if Effort Optimally Funded	1 year

APPENDIX E

FUNCTIONAL ASSESSMENT ASSUMPTIONS

Functions will change in proposed conditions in Magnuson Park based on the following assumptions:

1. 12 acres of existing impervious surfaces in Phase 2 will be removed and significant portions of that will be converted to wetland habitats or to athletic fields which will function to collect and 'meter' rainfall;
2. Stormwater runoff which comes off of road and parking lots within the Park, which is currently directly discharged to Lake Washington untreated, will be pre-treated and run through thousands of linear feet of wetlands prior to being discharged to the Lake;
3. Over 10 acres of wetland habitats will be created with deep inundation and duration regimes designed to provide excellent habitat opportunities to a broad range of native plant and wildlife species;
4. Over 4 acres of existing emergent wetland dominated by native and non-native grasses will be enhanced through active and passive means to increase inundation depths and duration, shift vegetation communities to more FACW/Obligate plants, and increase physical complexity and strata differentiation;
5. Upland and wetland forest and shrub habitats will be installed in the Project area providing (over time) necessary forest habitats for the other life stages of aquatic breeding amphibians and macroinvertebrates, as well as providing critical linking habitat which will function to improve habitat fragmentation on the site;
6. A maze of formal and informal trails throughout the habitat area in existing conditions will be consolidated and all of the informal trails will be removed. This will remove human contact in the interior of the habitat zones and reduce significantly the presence of dogs.
7. Existing wetlands on the site, although identified as closed depressions in the Wetland Delineation Report (2005) function as shallow flow-through systems as they simply overtop and sheet flow across the flat surrounding uplands in normal winter conditions.

A concern raised in the EIS process for the Master Plan for this portion of Magnuson Park was that the presence of lighting for athletic fields would have a significant adverse effect on wildlife associated with the Park. There was no scientific evidence that either confirmed or denied that concern; the scientific literature on lighting is for parameters that are far different than the limited number of hours/limited days/week schedule proposed at Magnuson. Therefore the City's conclusion was that there was not a basis in the literature to conclude that there would be or would not be adverse effects from field lighting. This conclusion was upheld in an appeal to the City Hearing Examiner of the adequacy of the EIS.

In an effort to shield the habitats from lighting effects, state-of-the-art shielding is proposed for all lights, additional plantings of conifers are proposed around the 'back side' of each light standard of the fields, and a limited lighting schedule has been imposed by the City Council.